IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/516,443

Applicant : Juma

Filed : 11/30/2004

Title : Fiber Reinforced Filter for Molten Metal ...

Art Unit : 1723

Examiner : Kim, Sun U.

Docket No. : 1489 (04-80)

To: Mail Stop Amendment
Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

AFFIDAVIT UNDER 37 C.F.R. 1.132

I, Kassim Juma, hereby swear and state that:

1. I have been active in research and development in the field of ceramics and/or metals for the last 30 years.

2. I received a Ph.D degree in Ceramics from Sheffield University, which is located in Sheffield - UK

3. I am the author of 20 papers in the field of ceramics and/or metals.

4. I am listed as an inventor on 31 US patents and foreign patents, particularly relating to products and methods related to ceramics, metals, and their processing.

5. I am very familiar with refractory filters as used in the casting of molten metals.

6. I have carried out and supervised numerous experimental and commercial trials concerning refractory filters.

7. Refractory filters for molten metal include a continuous matrix comprising a refractory material.

8. Refractory filters include a continuous matrix comprising a refractory ceramic. See, e.g., US 5,785,851 to Morris et al. (describing a filter comprising a sintered ceramic foam).

9. Refractory ceramic matrices require firing temperatures greater than 1000 C, and the resultant article can suffer from poor thermal shock resistance.

10. Refractory filters having a continuous matrix comprising graphite are very resistant to thermal shock, but forming a graphite matrix includes graphitizing a carbon-containing precursor in a reducing atmosphere at temperatures around 2000 C.

11. The selection of carbon-containing precursor is important because only a fraction of precursors can develop into graphite.

12. US 7,138,084 to Bell teaches a filter for molten metal comprising a refractory material embedded in and bonded together by a bonding material comprising a carbon matrix.

13. Bell forms the carbon matrix most preferably at temperatures around 600 C (see col. 10, lines 38-42), and the carbon matrix preferably is "in the form of a coke or semicoke (col. 3, lines 17-19).

14. Coke and semicoke are amorphous, that is, glassy forms of carbon.

15. These glassy carbons fully develops around 550 C and will not convert to graphite regardless of any subsequent heating.

16. "Char," as described in US 3,574,646 to Wismer, is an amorphous form of carbon produced by removing volatile materials from carbon-containing precursors.

17. "Char" will not convert to graphite at any temperature and is not a graphitizable carbon.

18. Graphitizable carbon includes carbon-containing precursors that begin to develop around 600 C, and fully convert to graphite only around 2000 C.

19. Benefits of graphitizable carbon over glassy carbon include at least:

    a. Higher oxidation temperature;

    b. Less brittleness;

    c. Essentially no shrinkage on firing compared to around 7% shrinkage for glassy carbon;

    d. Higher mechanical strength;

    e. Better thermal shock-resistance;

f. Lower levels of carbon required for bonding, for example, glassy carbon filters require up to 50% carbon while graphitizable carbon filters need only about 10% carbon.

20. Neither Bell nor Wismer form a continuous matrix comprising graphite or a graphitizable carbon.

21. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 2\|10\|2007

Kassim Juma